

[0044] Communication interface 260 may include, for example, a transmitter that may convert base band signals from processing logic 210 to radio frequency (RF) signals and/or a receiver that may convert RF signals to base band signals. Alternatively, communication interface 260 may include a transceiver to perform functions of both a transmitter and a receiver. Communication interface 260 may connect to antenna assembly 270 for transmission and reception of the RF signals. Antenna assembly 270 may include one or more antennas to transmit and receive RF signals over the air. Antenna assembly 270 may receive RF signals from communication interface 260 and transmit them over the air and receive RF signals over the air and provide them to communication interface 260.

[0045] Power supply 280 may include one or more power supplies that provide power to components of terminal 100. For example, power supply 280 may include one or more batteries and/or connections to receive power from other devices, such as an accessory outlet in an automobile, an external battery, or a wall outlet. Power supply 280 may also include metering logic to provide the user and components of terminal 100 with information about battery charge levels, output levels, power faults, etc.

[0046] As will be described in detail below, terminal 100, consistent with the principles described herein, may perform certain operations relating to receiving inputs via keypad area 110 in response to user inputs or in response to processing logic 210. Terminal 100 may perform these operations in response to processing logic 210 executing software instructions of a keypad configuration/reprogramming application contained in a computer-readable medium, such as storage 220. A computer-readable medium may be defined as a physical or logical memory device and/or carrier wave.

[0047] The software instructions may be read into storage 220 from another computer-readable medium or from another device via communication interface 260. The software instructions contained in storage 220 may cause processing logic 210 to perform processes that will be described later. Alternatively, hardwired circuitry may be used in place of or in combination with software instructions to implement processes consistent with the principles described herein. Thus, implementations consistent with the principles of the embodiments are not limited to any specific combination of hardware circuitry and software.

[0048] FIG. 3 illustrates an exemplary functional diagram of the keypad logic 240 of FIG. 2 consistent with the principles of the embodiments. Keypad logic 240 may include control logic 310, display logic 320, illumination logic 330, position sensing logic 340 and ultrasonic element activation logic 350.

[0049] Control logic 310 may include logic that controls the operation of display logic 320, and receives signals from position sensing logic 340. Control logic 310 may determine an input character based on the received signals from position sensing logic 340. Control logic 310 may be implemented as standalone logic or as part of processing logic 210. Moreover, control logic 310 may be implemented in hardware and/or software.

[0050] Display logic 320 may include devices and logic to present information via keypad area 110, to a user of terminal 100. Display logic 320 may include processing logic to interpret signals and instructions and a display device having a display area to provide information. Implementations of display logic 320 may include a liquid crystal display (LCD) that

includes, for example, biphenyl or another stable liquid crystal material. In this embodiment, keys 112 may be displayed via the LCD.

[0051] Illumination logic 330 may include logic to provide backlighting to a lower surface of keypad area 110 in order to display information associated with keys 112. Illumination logic 330 may also provide backlighting to be used with LCD based implementations of display logic 320 to make images brighter and to enhance the contrast of displayed images. Implementations of illumination logic 330 may employ light emitting diodes (LEDs) or other types of devices to illuminate portions of a display device. Illumination logic 330 may provide light within a narrow spectrum, such as a particular color, or via a broader spectrum, such as full spectrum lighting. Illumination logic 330 may also be used to provide front lighting to an upper surface of a display device or keypad area 110 that faces a user. Front lighting may enhance the appearance of keypad area 110 or a display device by making information more visible in high ambient lighting environments, such as viewing a display device outdoors.

[0052] Position sensing logic 340 may include logic that senses the position and/or presence of an object within keypad area 110. Implementations of position sensing logic 340 may be configured to sense the presence and location of an object. For example, position sensing logic 340 may be configured to determine a location (e.g., a location of one of keys 112) in keypad area 110 where a user places his/her finger regardless of how much pressure the user exerts on keypad area 110. Implementations of position sensing logic 340 may use capacitive, resistive or inductive techniques to identify the presence of an object and to receive an input via the object. In one implementation for example, position sensing logic 340 may include a transparent film that can be placed within keypad area 110. The film may be adapted to change an output, such as a voltage or current, as a function of a change in capacitance, resistance, or an amount of pressure exerted on the film and/or based on a location where capacitance, resistance or pressure is exerted on the film. For example, assume that a user presses on the film in an upper left hand corner of the film. The film may produce an output that represents the location at which the pressure was detected. Position sensing logic 340 may also include logic that sends a signal to ultrasonic element activation logic 350 in response to detecting the position and/or presence of an object within keypad area 110.

[0053] Ultrasonic element activation logic 350 may include mechanisms and logic to provide activation energy to an ultrasonic element, which when activated, provides a vibration that may provide tactile feedback to a user of terminal 100. For example, ultrasonic activation logic 350 may receive a signal from position sensing logic 340 and in response to this signal, provide a current and/or voltage signal to activate an ultrasonic element.

[0054] FIGS. 4A and 4B illustrate an exemplary key input system within keypad area 110. As shown, the key input system with keypad area 110 may include housing 101, touch sensitive cover 410, enclosure 420, liquid 430, ultrasonic element 440 and display screen 450.

[0055] As described above, housing 101 may include a hard plastic material used to mount components within terminal 100. In one embodiment, touch sensitive cover 410 may be mounted in housing 101 within keypad area 110.

[0056] Touch sensitive cover 410 may include a single sheet of glass that may cover components within keypad area